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(54) Transfer apparatus for a depository

(57) Transfer apparatus (1) for transferring a lodgement envelope from an opening (2) in a panel (3) to a safe (4), the apparatus (1) comprises a main housing (7) of cylindrical construction. A main inlet (19) and a main outlet (20) are provided in the main housing (7) for communicating respectively with the opening (2) in the panel (3) and the safe (4). A transfer housing (27) which forms a chute (30) is pivotally mounted in the main housing (7) by pivot shafts (35, 36). The transfer housing (27) is pivotal for selectively and alternatively communicating the chute (30) with the main inlet (19) and the main outlet (20) for respectively receiving and discharging the envelope through the chute (30). A closure plate (38) closes the main inlet (19) when the chute (30) communicates with the main outlet (20). A latch mechanism may be provided to hold the transfer housing (27) in the discharge position and which releases the transfer housing once a sensor has detected that the envelope has passed through the main outlet (20).

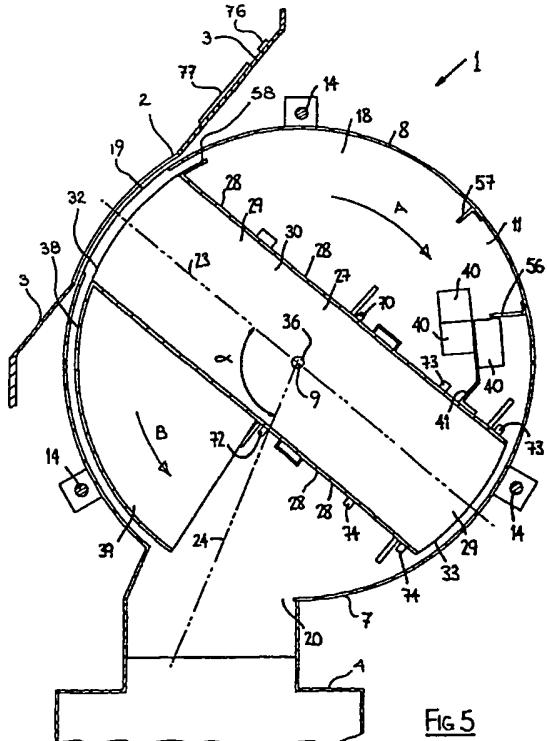


FIG 5

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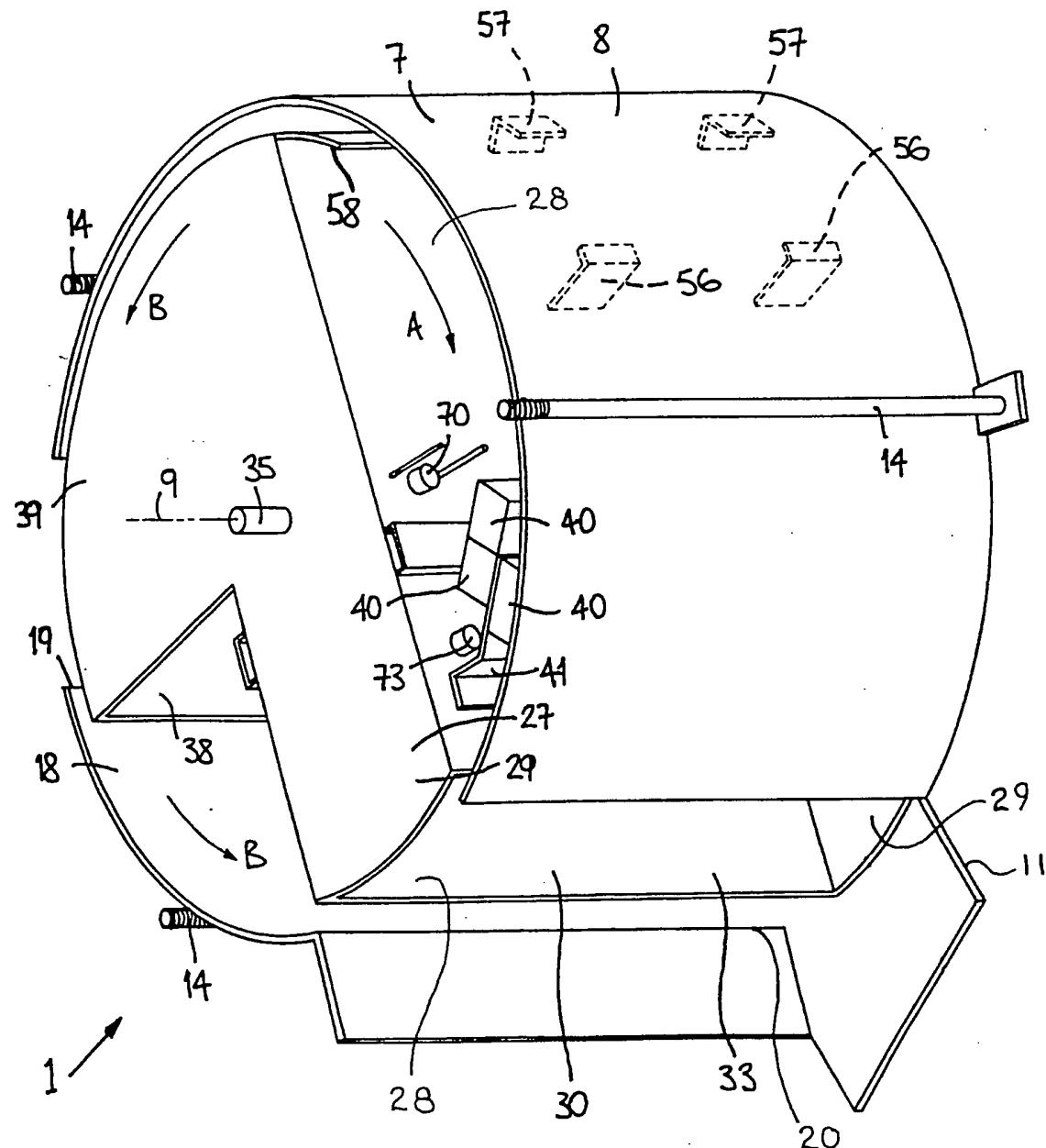


FIG 1

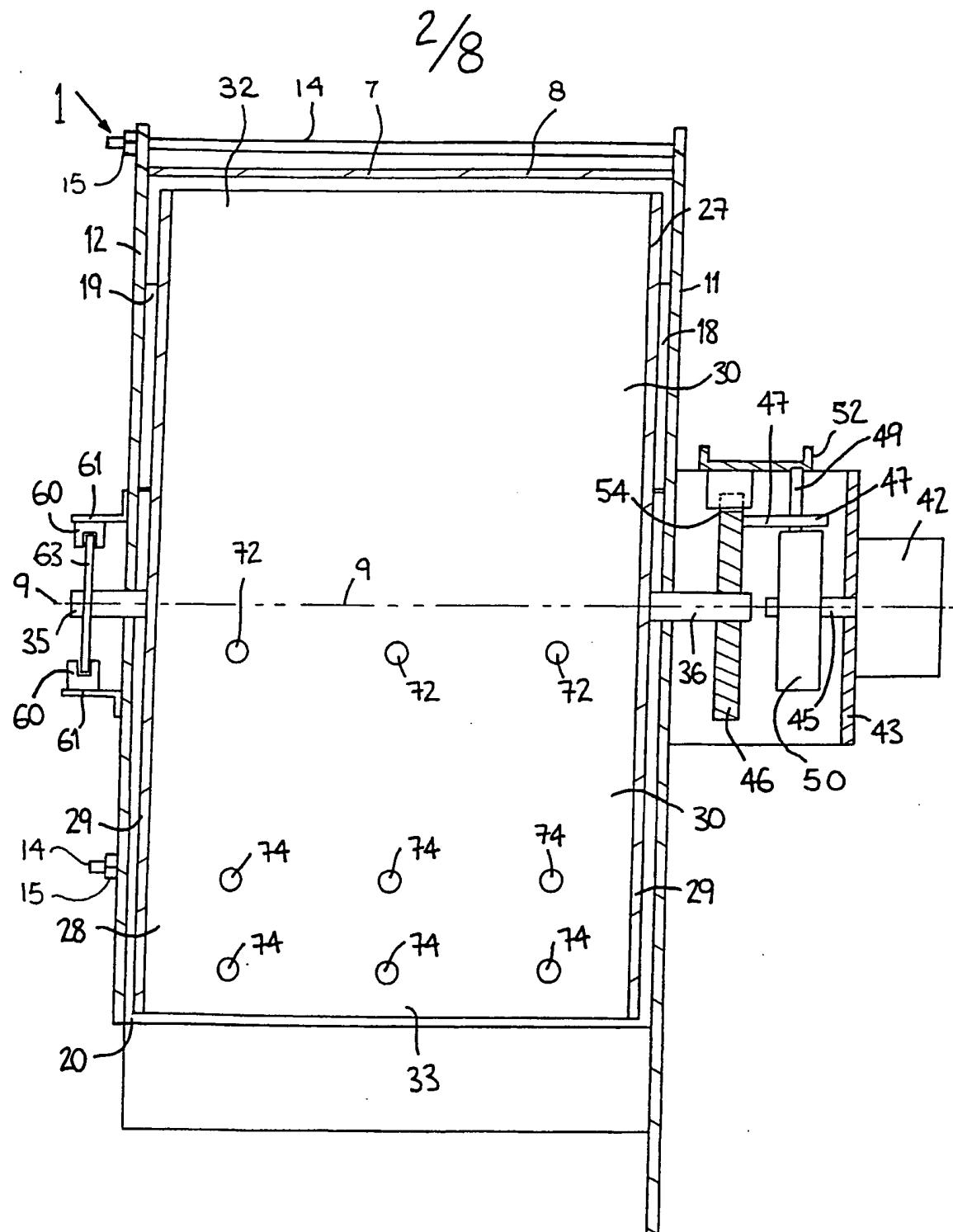


FIG 2

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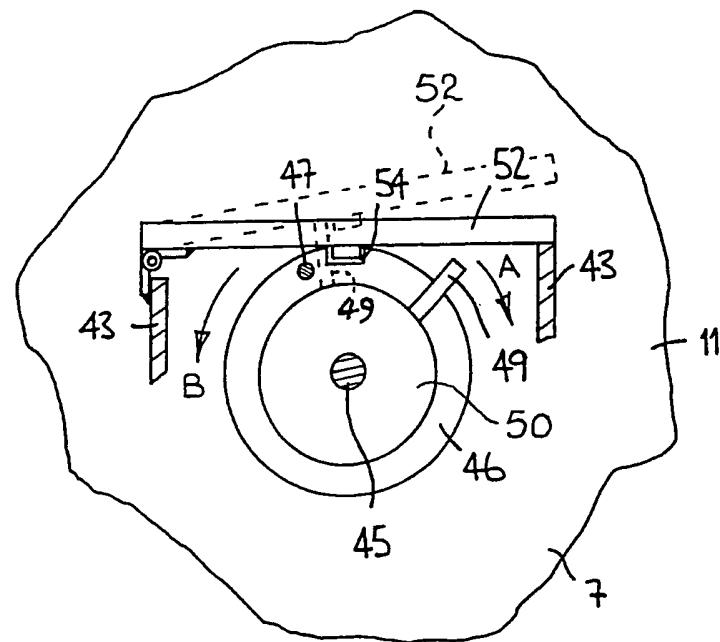


FIG 3

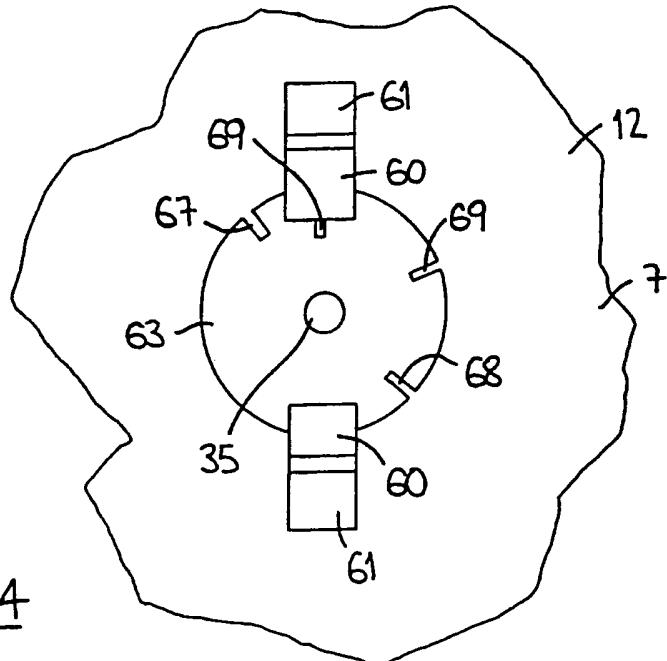


FIG 4

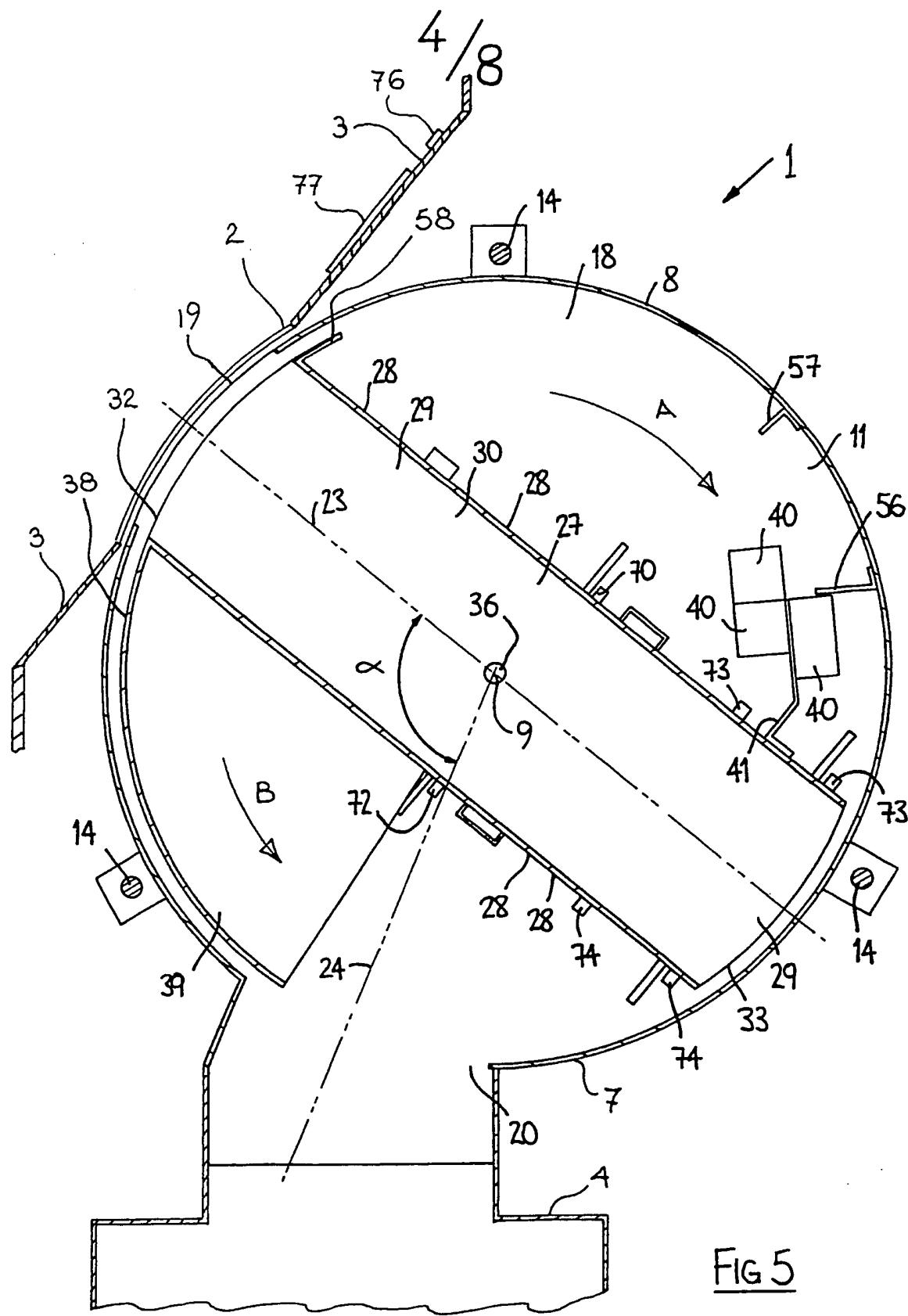


FIG 5

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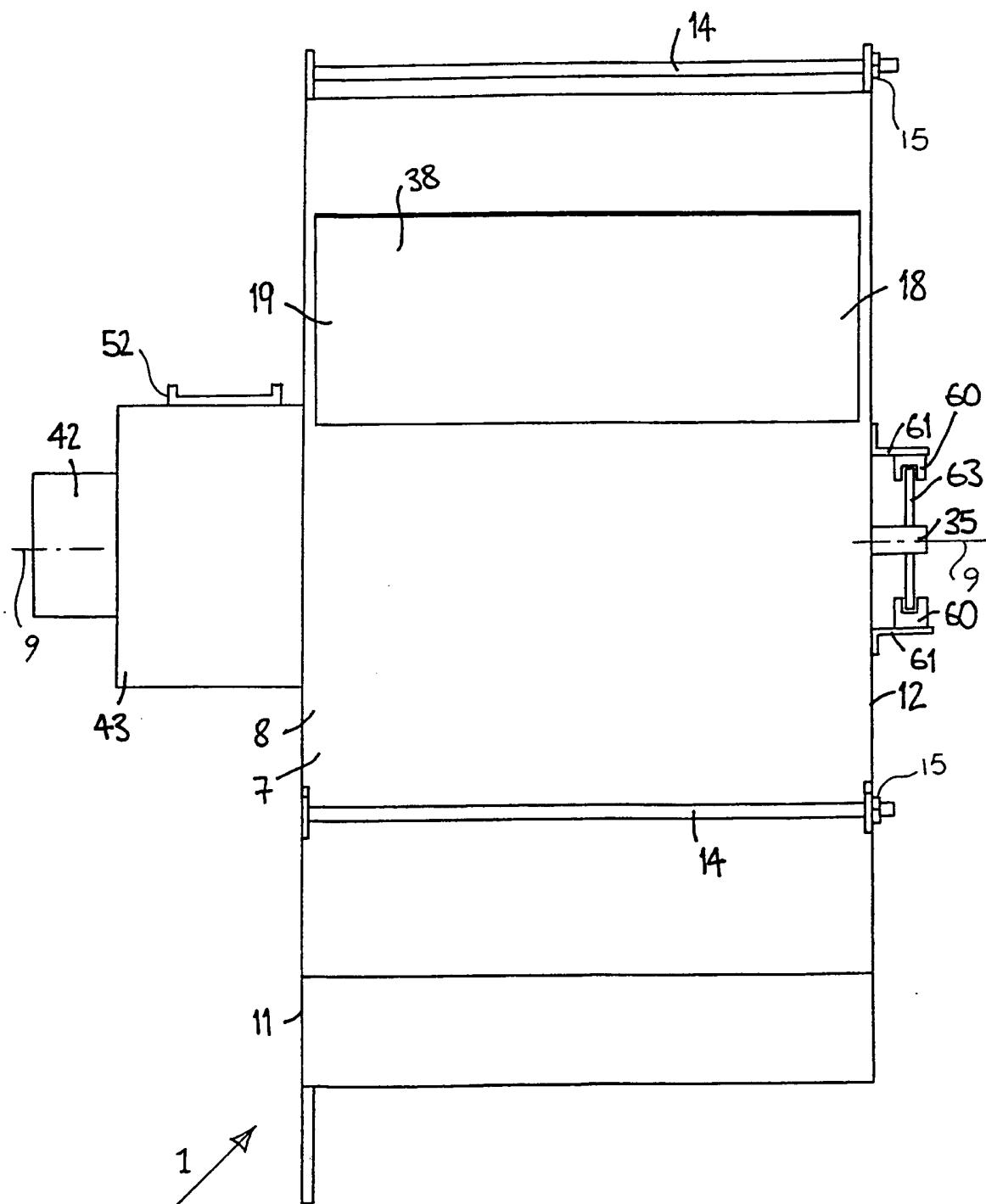
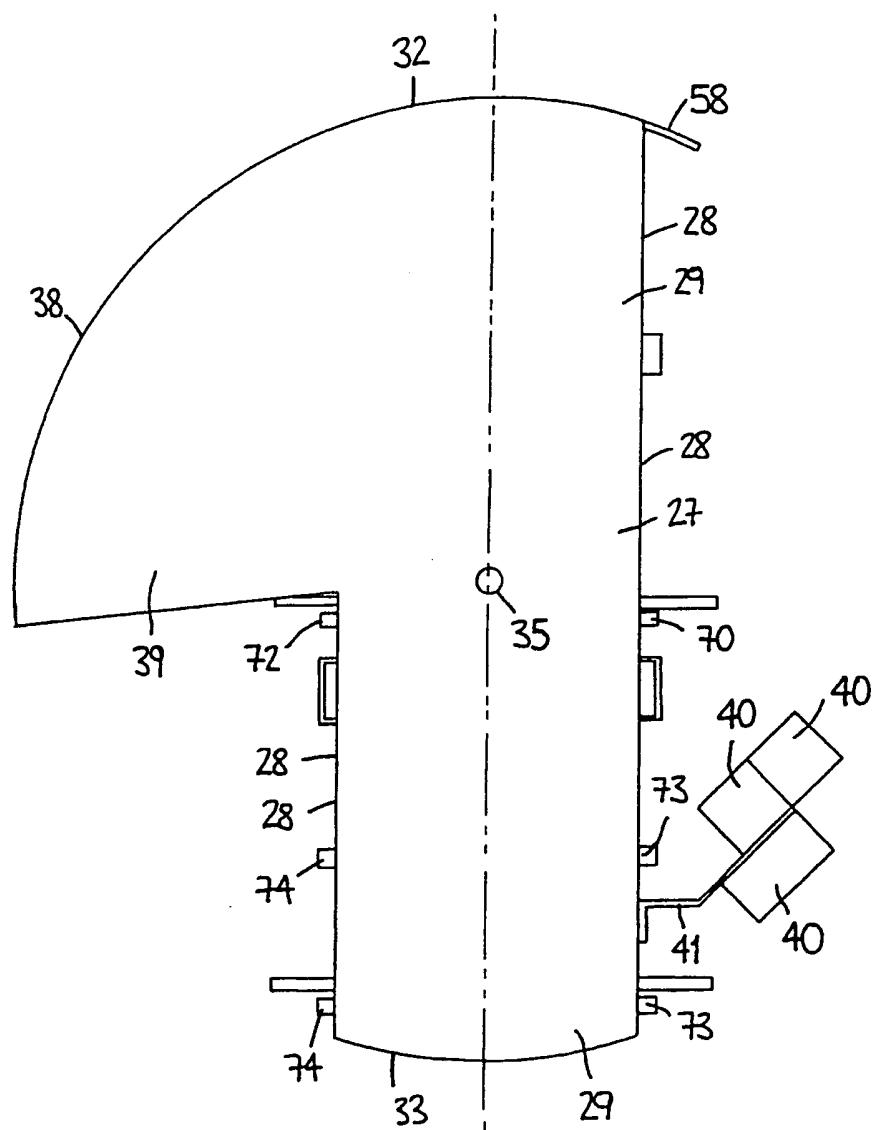


FIG 6

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FIG 7

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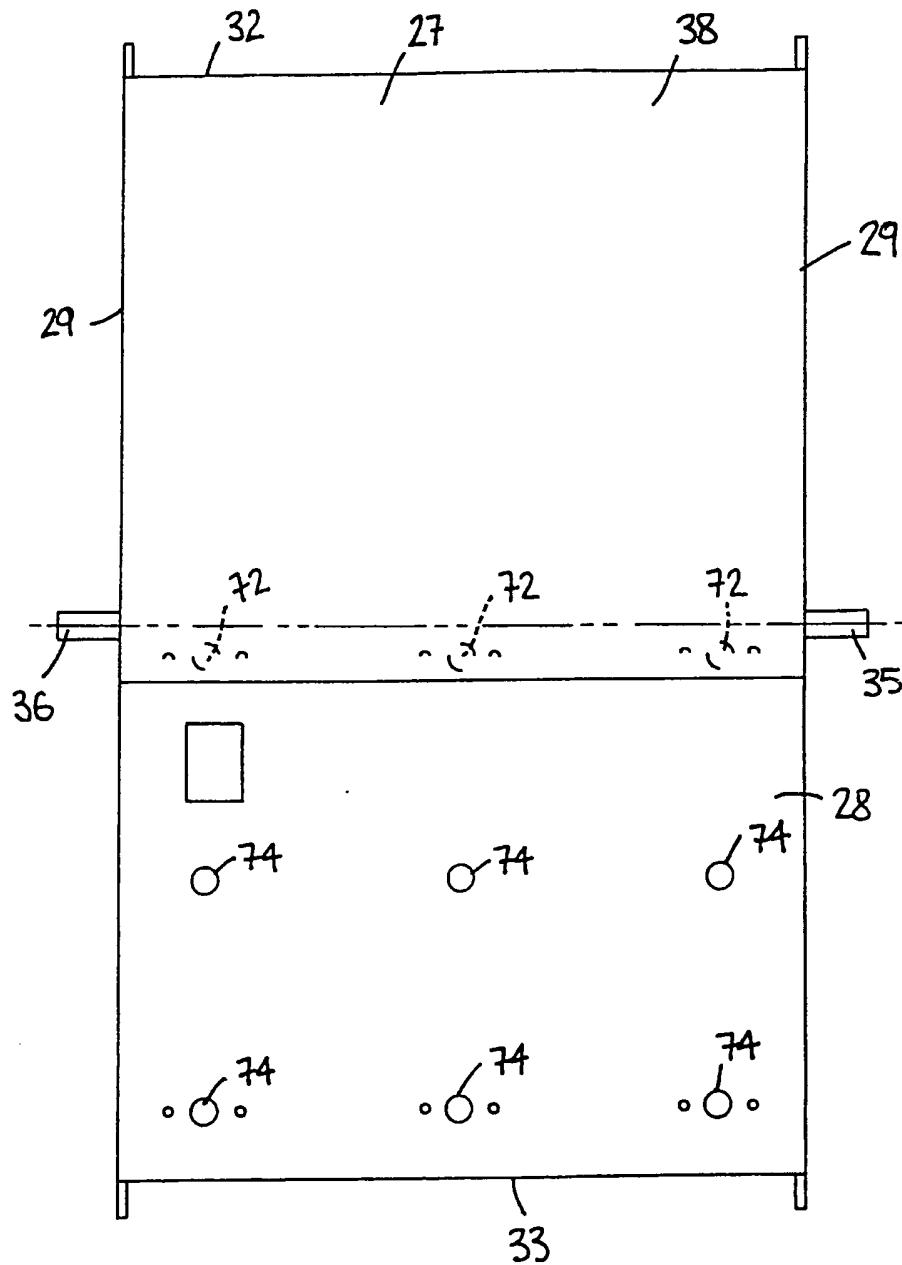


FIG8

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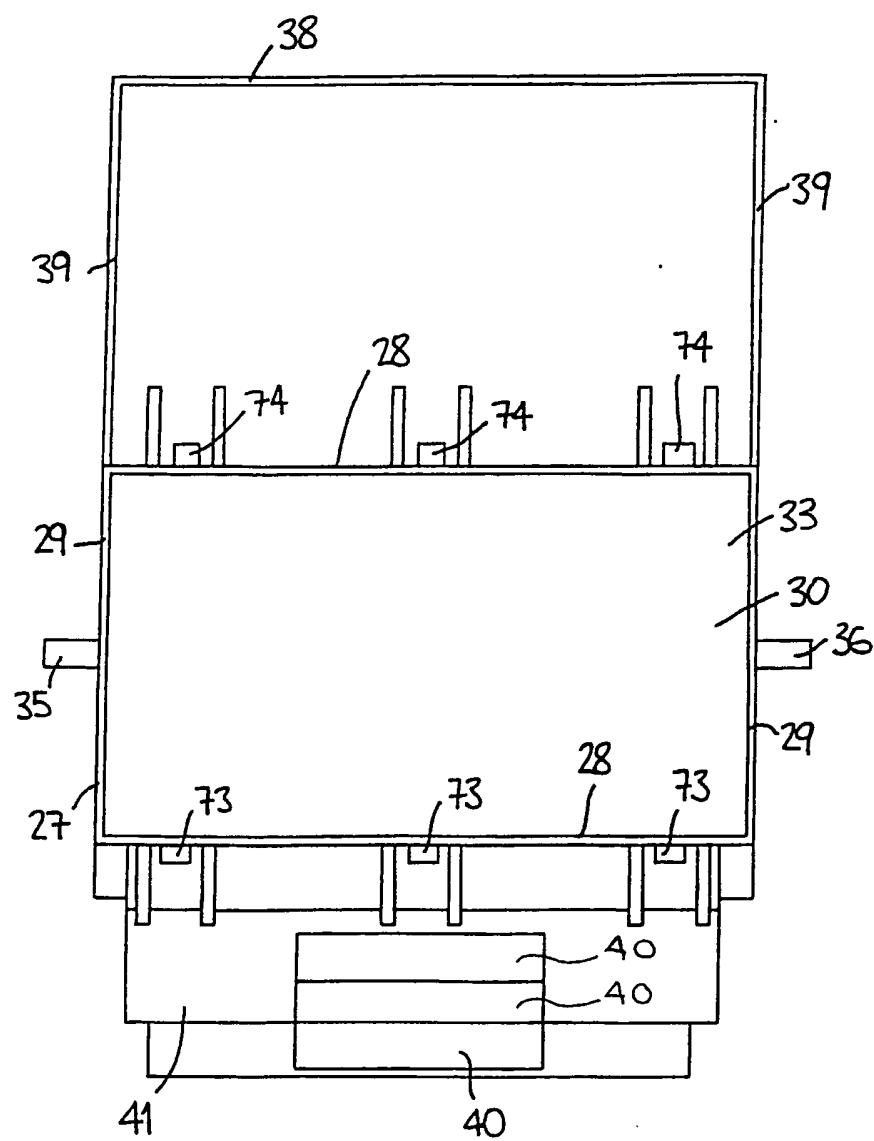


FIG 9

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"Transfer apparatus"

The present invention relates to transfer apparatus, and in particular, though not limited to security transfer apparatus for transferring an article to a container, for example, transfer apparatus which would normally be located adjacent an opening in an external wall of a bank building for receiving a lodgement of money or the like in a pouch or envelope for transfer to a remotely located safe within the bank building.

Such transfer apparatus is known. In general, known transfer apparatus is associated with automatic teller machines, of the type which are typically located in an opening in an external wall of a bank or the like. In general, a chute extends from an input opening in a panel of the automatic teller machine, and the chute extends internally into the bank building to a remotely located safe located within the bank building. A closure member, generally provided by a closure flap, is provided for selectively opening and closing the input opening to the chute. After a lodgement has been made, and the lodgement pouch or envelope has been detected by a suitable detecting means passing through the chute, the closure flap is automatically closed and remains closed until the next lodgement is to be made.

However, it is possible for a dishonest user, by

securing a string to the lodgement pouch or envelope, to retrieve the lodgement pouch after the lodgement has been confirmed. The user by activating the automatic teller machine for a second lodgement retrieves the 5 lodgement pouch by pulling the string on the closure member opening for the second lodgement.

There is therefore a need for transfer apparatus which overcomes this and other problems associated with known transfer apparatus for use with automatic teller 10 machines, and indeed, transfer apparatus for other uses.

The present invention is directed towards providing such transfer apparatus.

According to the invention, there is provided transfer 15 apparatus for transferring an article to a container, the transfer apparatus comprising a main housing defining a main hollow interior region and having a main inlet to and a main outlet from the main hollow interior region, a transfer housing mounted within the 20 main hollow interior region of the main housing, the transfer housing having a secondary hollow interior region for receiving the article, and a communicating means for selectively and alternately communicating the secondary hollow interior region with the main inlet

and the main outlet of the main housing, the transfer housing being movable within the main hollow interior region from a receiving position with the communicating means communicating the secondary hollow interior
5 region with the main inlet for receiving the article in the secondary hollow interior region, to a discharge position with the communicating means communicating the secondary hollow interior region with the main outlet for discharging the article to the container, a closure
10 means on the transfer housing for closing the main inlet of the main housing when the communicating means is communicating the secondary hollow interior region with the main outlet, and a means for moving the transfer housing between the receiving position and the
15 discharge position.

Preferably, the closure means closes the main inlet before the communicating means communicates the secondary hollow interior region with the main outlet.

Advantageously, a detecting means is provided for
20 detecting when the article has passed from the secondary hollow interior region through the main outlet, and a retaining means is provided for retaining the transfer housing in the discharge position, the retaining means being responsive to the detecting means
25 for retaining the transfer housing in the discharge

position on the detecting means failing to detect the passage of the article through the main outlet, and the retaining means being responsive to the detecting means for releasing the transfer housing for enabling the 5 transfer housing to move from the discharge position to the receiving position on the detecting means detecting the passage of the article through the main outlet.

Ideally, the retaining means comprises a latch means co-operable with the transfer housing, the latch means 10 being movable from an engaged position retaining the transfer housing in the discharge position to a disengaged position enabling the transfer housing to move from the discharge position to the receiving position.

15 In one aspect of the invention, the means for moving the transfer housing between the receiving position and the discharge position comprises a drive motor for moving the transfer housing from the discharge position to the receiving position. Preferably, the retaining 20 means is co-operable with the drive motor for releasing the retaining means prior to the drive motor moving the transfer housing from the discharge to the receiving means.

Advantageously, a disabling means is provided for

disabling the drive motor for preventing the drive motor moving the transfer housing from the discharge position to the receiving position, the disabling means being responsive to the detecting means for disabling 5 the drive motor on the detecting means failing to detect passage of the article through the main outlet.

- Preferably, the means for moving the transfer housing between the receiving position and the discharge position comprises an urging means for urging the 10 transfer housing from the receiving position to the discharge position. Advantageously, the urging means comprises a counterweight mounted on the transfer housing for urging the transfer housing from the receiving position into the discharge position.
- 15 Ideally, the communicating means comprises a secondary inlet and a secondary outlet located in the transfer housing communicating with the secondary hollow interior region, for communicating respectively with the main inlet and the main outlet.
- 20 Advantageously, the secondary hollow interior region defines an elongated chute extending through the transfer housing from the secondary inlet to the secondary outlet. Preferably, the transfer housing is pivotally mounted in the main housing.

Ideally, the main housing is of cylindrical construction comprising a cylindrical wall extending between respective opposite spaced apart end caps, the cylindrical wall with the end caps defining the main

5 hollow interior region, and the cylindrical wall defining an axis of generation which forms the central axis of the main hollow interior region, the pivot axis of the transfer housing co-inciding with the central axis of the main housing. Preferably, the main inlet

10 and the main outlet are provided through the cylindrical wall at circumferentially spaced apart locations.

In one aspect of the invention, the transfer housing extends diametrically across the main hollow interior

15 region through the central axis. Preferably, the transfer housing extends diametrically across the main hollow interior region a distance just less than the internal diameter of the main hollow interior region to facilitate pivoting of the transfer housing between the

20 receiving and discharge positions.

In one aspect of the invention, the centre line of the main outlet and the centre line of the main inlet extend from the central axis of the main hollow interior region and are disposed at an angle of at

25 least 70° relative to each other.

Preferably, the centre lines of the main outlet and the main inlet are disposed to each other at an angle of at least 90°. Advantageously, the centre lines of the main outlet and the main inlet are disposed to each 5 other at an angle in the range of 110° to 120°.

In another aspect of the invention, the transfer housing is pivotal through an angle from the receiving position to the discharge position of at least 60°.

Preferably, the transfer housing is pivotal through an 10 angle from the receiving position to the discharge position of at least 70°. Advantageously, the transfer housing is pivotal through an angle from the receiving position to the discharge position of at least 90°.

Preferably, the transfer housing is pivotal through an 15 angle from the receiving position to the discharge position in the range of 60° to 70°.

In one aspect of the invention, a stop means is provided in the main housing for limiting the angle of movement of the transfer housing between the receiving 20 and discharge positions for aligning the respective main and secondary inlets and the respective main and secondary outlets when the transfer housing is in the receiving and discharge positions, respectively.

Preferably, a limit sensing means is provided for 25 monitoring the position of the transfer housing.

Advantageously, the detecting means comprises a first detecting means for detecting the presence of the article in the secondary hollow interior region, and a second detecting means for detecting discharge of the 5 article through the main outlet. Preferably, the second detecting means comprises at least two sensing means, the sensing means being located towards the secondary outlet at longitudinally spaced apart intervals along the chute for detecting the progressive 10 movement of the article along the chute through the outlet. Advantageously, each sensing means comprises a photoelectric sensor.

In one aspect of the invention, the transfer apparatus is for transferring an envelope or pouch from an input 15 opening formed in a panel to a container remotely located from the input opening.

The invention will be more clearly understood from the following description of a preferred embodiment thereof, given by way of example only, with reference 20 to the accompanying drawings, in which:

Fig. 1 is a perspective view of transfer apparatus according to the invention with portion of the transfer apparatus removed,

Fig. 2 is a sectional end elevational view of the transfer apparatus of Fig. 1,

Fig. 3 is a side elevational view of a portion of the transfer apparatus of Fig 1,

5 Fig. 4 is a side elevational view of another portion of the apparatus of Fig. 1,

Fig. 5 is a sectional side elevational view of the apparatus 1 illustrated in use,

10 Fig. 6 is an end elevational view of a portion of the apparatus of Fig. 1,

Fig. 7 is a side elevational view of another portion of the apparatus of Fig. 1,

Fig. 8 is an end elevational view of the portion of Fig. 7, and

15 Fig. 9 is an underneath plan view of the portion of Fig. 7.

Referring to the drawings, there is illustrated security transfer apparatus according to the invention indicated generally by the reference numeral 1 for

transferring an article, typically an envelope or pouch (not shown) containing a lodgement of funds from an input opening 2 in a panel 3 of, for example, an automatic teller machine located in an opening in an 5 external wall of a bank to a remotely located safe 4 located within the bank building. Only the panel 3 of the automatic teller machine is illustrated in Fig. 5, and only a portion of the safe 4 is illustrated in Fig. 5. The safe 4 may be located relatively close to the 10 transfer apparatus 1, although, in general, it would be remotely located, and a chute may be provided between the transfer apparatus 1 and the safe 4 for accommodating the lodgement envelope to the safe 4. The construction and relative positioning of such 15 automatic teller machines and safes will be well known to those skilled in the art.

The transfer apparatus 1 comprises a main housing 7 of cylindrical construction constructed from 2 mm mild steel sheet material. The main housing 7 comprises a 20 cylindrical shell 8 the axis of generation of which defines a central axis 9. An end cap 11 is seam welded to the cylindrical shell 8 at one end thereof, and an end cap 12 is secured to the other end of the cylindrical shell 8 by screws 14 extending from the end 25 cap 11 and nuts 15 on the screws 14. The cylindrical shell 8 and end caps 11 and 12 define a main hollow

interior region 18. A main inlet 19 of rectangular cross section to the main hollow interior region 18 is formed in the cylindrical shell 8 and communicates with the input opening 2 in the panel 3. A main outlet 20 of rectangular cross section from the main hollow interior region 18 is also formed in the cylindrical shell 8 and communicates with the safe 4. Centre lines 23 and 24 of the main inlet 19 and main outlet 20, respectively, extend from the central axis 9 and are disposed at an angle α of approximately 107° relative to each other, see Fig. 5.

A transfer housing 27 of 1.5 mm mild steel sheet material is pivotally mounted within the main hollow interior region 18 for receiving and transferring the lodgement envelope through the transfer apparatus 1 from the main inlet 19 through the main outlet 20. The transfer housing 27 comprises a pair of side walls 28 joined by end walls 29 which together define a secondary hollow interior region in the form of an elongated chute 30 through which the lodgement envelope passes through the transfer apparatus 1. The chute 30 terminates in communicating means, namely, a secondary inlet 32 and a secondary outlet 33 for selectively and alternately communicating the chute 30 respectively with the main inlet 19 and the main outlet 20. A pair of stub shafts 35 and 36 extend from the respective end

12

walls 29, and are rotatably carried in bearings (not shown) in the end caps 12 and 11, respectively, of the main housing 7. The stub shafts 35 and 36 define a common pivot axis which co-incides with the central 5 axis 9, and the transfer housing 27 is pivotal in the main hollow interior region 18 about the central axis 9. The transfer housing 27 is pivotal through an angle ($180^\circ - \alpha$) which in this case is approximately 73° in the direction of the arrow A about the central axis 9 from 10 a receiving position illustrated in Fig. 5 with the secondary inlet 32 aligned with the main inlet 19 for receiving the lodgement envelope into the chute 30, to a discharge position illustrated in Fig. 1 with the secondary outlet 33 aligned with the main outlet 20 for 15 discharging the lodgement envelope from the chute 30 through the main outlet 20 into the safe 4.

A closure means in this case comprising an arcuate closure plate 38 of 1.5 mm mild steel sheet material extends from one of the side walls 28 for closing the 20 main inlet 19 when the chute 30 is communicating through the secondary outlet 33 with the main outlet 20, in other words, when the transfer housing 27 has moved from the receiving position to the discharge 25 position. The axis of generation of the arcuate closure plate 38 co-incides with the central axis 9 of the main housing 7 and the radius of the outer surface

of the closure plate 38 is just less than the radius of the inner surface of the cylindrical shell 8 so that the closure plate 38 is a relatively close fit in the cylindrical shell 8. The circumferential length of the 5 closure plate 38 and the circumferential width of the main inlet 19 and the main outlet 20 and their relative positions, as well as the width of the chute 30 between the side walls 28 are chosen so that the closure plate 38 completely closes the main inlet 19 before the 10 secondary outlet 33 and the main outlet 20 begin to communicate. Accordingly, direct access through the transfer apparatus 1 from the main inlet 19 to the main outlet 20 is prevented, and accordingly, direct access from the input opening 2 to the safe 4 is also 15 prevented during all positions of the transfer housing 27 between the receiving position and the discharge position inclusive. Thus, any danger of retrieval of a lodgement envelope directly from the safe 4 in the event of the lodgement envelope being secured to a 20 string by pulling the string through the input opening 2 is prevented. Support plates 39 extending between one of the side walls 28 and the closure plate 38 support and secure the closure plate 38 to the transfer housing 27.

25 A means for moving the transfer housing 27 from the receiving position to the discharge position comprises

an urging means, namely, counterweights 40 which urge the transfer housing 27 towards and into the discharge position from the receiving position. In this case, three counterweights 40 are provided, and the 5 counterweights 40 are carried on mounting brackets 41 which are secured to one of the side walls 28. The counterweights 40 are of sufficient weight and are disposed relative to the central axis 9, namely, the pivot axis of the transfer housing 27 so that the 10 action of the counterweights 40 under gravity urges the transfer housing 27 into the discharge position at all positions of the transfer housing 27 between the receiving position and the discharge position.

A means for moving the transfer housing 27 from the 15 discharge position to the receiving position, in other words, for returning the transfer housing 27 from the discharge position to the receiving position comprises an electrically powered drive motor 42 mounted on a mounting bracket 43 on the end cap 11, see Fig. 2. A 20 drive shaft 45 of the drive motor 42 transmits drive from the drive motor 42 to the stub shaft 36 for pivoting the transfer housing 27 from the discharge position to the receiving position. A radially extending pin 49 extending from a drive disc 50 rigidly 25 carried on the drive shaft 45 co-operates with an eccentrically mounted pin 47 extending from a driven

disc 46, which is rigidly carried on the stub shaft 36 for transmitting drive from the drive shaft 45 to the stub shaft 36. On the drive motor 42 rotating the drive shaft 45 in the direction of the arrow B, see Fig. 3, the radial pin 49 is moved in the direction of the arrow B from the position illustrated in full lines in Fig. 3 to the position illustrated in broken lines in Fig. 3 for engaging the eccentric pin 47. Further rotation of the drive shaft 45 in the direction of the arrow B thus transmits drive from the radial pin 49 through the eccentric pin 47 for pivoting the transfer housing 27 from the discharge position to the receiving position. Rotation of the drive shaft 45 in the direction of the arrow A, see Fig. 3, returns the radial pin 49 to the position illustrated in full lines in Fig. 3, thereby permitting the transfer housing 27 to pivot from the receiving position to the discharge position under the urging action of the counterweights 40.

20 A retaining means, in this case, a latch means provided by a latch 52 is pivotally mounted on the bracket 43 and releasably engages a peripheral recess 54 in the driven disc 46 for releasably retaining the transfer housing 27 in the discharge position. The radial pin 49, see Figs. 2 and 3, is of sufficient length, and when moving in the direction of the arrow B co-operates

with the latch 52 for pivoting the latch 52 from an engaged position, engaging the recess 54, illustrated in full lines in Fig. 3 for retaining the transfer housing 27 in the discharge position, to a disengaged 5 position illustrated in broken lines in Fig. 3 disengaged from the driven disc 46 for permitting the transfer housing 27 to pivot freely from the discharge position to the receiving position. The drive motor 42 and the radial pin 49 are so arranged that when the 10 drive motor 42 has been returned to its rest position with the transfer housing 27 in the discharge position, the radial pin 49 takes up the position illustrated in full lines in Fig. 3. Accordingly, on the drive motor 42 commencing to rotate the drive shaft 45 in the 15 direction of the arrow B, the radial pin 49 is initially pivoted from the position shown in full lines in Fig. 3 to the position shown in broken lines in Fig. 3, thereby releasing the latch 52 from the driven disc 46, so that further rotation of the drive shaft 45 in 20 the direction of the arrow B causes the radial pin 49 to co-operate with the eccentric pin 47 for pivoting the transfer housing 27 from the discharge to the receiving position.

A pair of stop means comprising four stop members 56 25 and 57 are mounted on the cylindrical shell 8 and extend into the main hollow interior region 18 for

engaging the transfer housing 27 for limiting the pivotal movement of the transfer housing 27 within the main hollow interior region 18. The stop members 57 are engagable with an arcuate abutment plate 58

5 extending from one of the side walls 28 for limiting movement of the transfer housing 27 in the direction of the arrow A for locating the transfer housing 27 in the discharge position. The stop members 56 are engagable with one of the counterweights 40 for limiting movement

10 of the transfer housing 27 in the direction of the arrow B and for locating the transfer housing 27 in the receiving position.

A limit sensing means for monitoring and identifying the position of the transfer housing 27 comprises a

15 pair of limit photoelectric sensors 60 carried on brackets 61 which in turn are mounted on the end cap

12. The photoelectric sensors 60 co-operate with a disc 63 rigidly carried on the stub shaft 35 for monitoring the position of the transfer housing 27. A

20 pair of grooves 67 and 68 are provided adjacent the periphery of the disc 63 at locations corresponding to the receiving and discharge positions, respectively, of the transfer housing 27 and are monitored by the photoelectric sensors 60 for determining when the

25 transfer housing 27 is in the receiving and discharge positions, respectively. Intermediate grooves 69 are

provided adjacent the periphery of the disc 63 and monitored by the photoelectric sensors 60 for determining if the transfer housing 27 jams intermediate the receiving and discharge positions, for example, if the transfer housing 27 is jammed by a lodgement envelope being trapped between the main outlet 20 and the secondary outlet 33. The photoelectric sensors 60 are connected to a control circuit (not shown but the function of which is described below) for controlling the operation of the transfer apparatus 1, and by reading the outputs of the photoelectric sensors 60, the control circuit determines roughly in which position the transfer housing 27 becomes jammed, whether it is at a position halfway between the receiving position and the discharge position, or whether the transfer housing has become jammed between the halfway position and either of the receiving and discharge positions.

A detecting means comprising a first detecting means for detecting the presence of a lodgement envelope in the chute 30 comprises three photoelectric sensors 70 mounted on one of the side walls 28, and three corresponding light sources 72 mounted on the other side wall 28 of the transfer housing 27. The photoelectric sensors 70 are located at spaced apart intervals transversely across the chute 30, and the

light sources 72 are correspondingly located on the other side wall 28. The detecting means also comprises a second detecting means, namely, six photoelectric sensors 73 for detecting the passage of the lodgement envelope from the chute 30 through the main outlet 20. The six photoelectric sensors 73 are located on one of the side walls 28 and six corresponding light sources 74 are located at corresponding positions on the other side wall 28 of the transfer housing 27. The 5 photoelectric sensors 73 are located in two groups of three towards the secondary outlet 33, the three photoelectric sensors 73 of each group being spaced apart transversely across the chute 30, and the two groups of three photoelectric sensors 73 are located at 10 longitudinally spaced apart locations along the chute 30 for monitoring the lodgement envelope as it progressively passes through the chute 30 and from the chute 30 through the main outlet 20. The photoelectric sensors 70 and 73 are connected to the control circuit 15 20 (not shown).

The control circuit for controlling the operation of the transfer apparatus 1 which is not illustrated, in general, would be located in a suitable housing mounted on one of the end caps 11 or 12. The drive motor is 25 powered through and controlled by the control circuit. A disabling circuit (also not shown) is provided in the

control circuit (not shown) for disabling the electric motor 43 when the transfer housing is in the discharge position, and in the event that signals from the photoelectric sensors 70 and 73 indicate that a 5 lodgement envelope was placed in the chute 30, but the lodgement envelope did not pass out of the chute 30 through the main outlet 20. In which case, the disabling circuit is activated for disabling the drive motor 42 until the transfer apparatus 1 has been 10 inspected to ascertain why the lodgement envelope did not pass through the main outlet 20. This, thus, avoids the drive motor 42 pivoting the transfer housing 27 to the receiving position, which would allow a dishonest user to withdraw a lodgement envelope 15 directly from the chute 30, particularly, if the lodgement envelope was secured to the end of a piece of string passing through the input opening 2. The control circuit 73, by reading the signals from the photoelectric sensors 70 and 73, confirms a lodgement 20 transaction having been completed on the photoelectric sensors 73 indicating that the lodgement envelope has passed through the chute 30 and the main outlet 20.

A button operated activating switch 76 is located on the panel 3 and is connected to the control circuit 25 (not shown) for allowing a user to operate the transfer apparatus as will be described below. A keypad 77 also

located on the panel 3 is connected to the control circuit (not shown) for enabling a user to input his or her personal identification number for enabling the transfer apparatus 1 to permit a lodgement to be made.

- 5 In use, a user wishing to make a lodgement into the safe 4 enters his or her personal identification number through the keypad 77 on the panel 3. On a correct personal identification number being inputted, the transfer apparatus 1 is enabled. The user then by
- 10 operating the push button operated switch 76 on the panel 3 activates the drive motor 42 for driving the driven disc 50 in the direction of the arrow B for, in turn, pivoting the transfer housing 27 from the discharge position to the receiving position. That is,
- 15 of course, provided that the disabling circuit (not shown) in the control circuit (also not shown) has been deactivated from the previous transaction as will be described below. On the drive motor 42 commencing to rotate the drive shaft 45, the latch 52 is pivoted into
- 20 the disengaged position. Further rotation of the drive shaft 45 pivots the transfer housing from the discharge position to the receiving position. On the transfer housing 27 being pivoted into the receiving position, the secondary inlet 32, the main inlet 19 and the opening 2 in the panel 3 are aligned. The user places
- 25 the lodgement envelope in the chute 30. The presence

of the lodgement envelope in the chute 30 is confirmed by the photoelectric sensor 70. The user again operates the push button operated activating switch 76, which on this occasion causes the drive motor 42 to 5 rotate the drive disc 50 in the reverse direction, namely, in the direction of the arrow A for permitting the transfer housing 27 to pivot into the discharge position under the action of the counterweights 40.

When the drive motor 42 has finished driving the drive 10 disc 50 in the direction of the arrow A, the radial pin 49 is in the position illustrated in full lines in Fig. 3, and is thus disengaged from the latch 52. On the transfer housing 27 being urged into the discharge position, the latch 52 engages the recess 54 in the 15 drive disc 50, thereby retaining the transfer housing 27 in the discharge position. In the discharge position, the lodgement envelope passes through the chute 30, the secondary outlet 33 and the main outlet 20 into the safe 4. Delivery of the lodgement envelope 20 from the chute 30 and completely through the main outlet 20 is confirmed by the photoelectric sensors 73, and the lodgement transaction is confirmed as having been completed by the control circuit. The transfer apparatus 1 is then ready for the next lodgement 25 transaction.

However, in the event that the photoelectric sensors 73

fail to confirm the passage of a lodgement envelope through the main outlet 20 and the presence of a lodgement envelope in the chute 30 was already confirmed by the photoelectric sensors 70, the 5 lodgement transaction is recorded as being incomplete, and the disabling circuit (not shown) in the control circuit (also not shown) is activated for disabling the drive motor 42 until the transfer apparatus 1 has been inspected. Thus, should a lodgement envelope remain in 10 the chute 30 as a result of being deliberately retained by the user, for example, by being retained by a string tied onto the lodgement envelope, or should the lodgement envelope become inadvertently caught in the chute 30, the transfer apparatus 1 is disabled in the 15 discharge position, thereby preventing retrieval of the lodgement envelope until the transfer apparatus 1 has been inspected and the lodgement envelope safely deposited in the safe 4. It will be appreciated that once the drive motor 42 is disabled when the transfer 20 housing 27 is in the discharge position, the latch 52 thus remains in the retaining position, thereby retaining the transfer housing 27 in the discharge position. A suitable override means (not shown) is provided for enabling authorised individuals to 25 override the disabling circuit to permit operation of the drive motor 42 should this be necessary for freeing and/or releasing the lodgement envelope from the chute

30.

The advantages of the invention are many. Firstly, the transfer apparatus according to the invention provides a safe and secure transfer apparatus for transferring a lodgement envelope or any other articles to a safe or other container. Additionally, the input opening in the panel which is accessible to the user is isolated from the safe, in other words, a user cannot gain direct access to the safe through the chute of the transfer apparatus. By virtue of the fact that the drive motor for pivoting the transfer housing is disabled on a transaction not having been completed, pivoting of the transfer housing to the receiving position is prevented, thereby preventing any danger of a lodgement transaction being confirmed and the lodgement envelope being subsequently withdrawn. Accordingly, there is no danger of a user being able to fraudulently claim that a lodgement envelope had been lodged into the safe. Additionally, by virtue of the fact that the closure plate closes the main inlet, and in turn the input opening in the panel prior to the secondary outlet and main outlet communicating, direct access to the safe by a user is further avoided.

A further advantage of the invention is that by providing the three photoelectric sensors 70

confirmation of a lodgement envelope in the chute is obtained. A particularly important advantage of the invention is that by providing the six photoelectric sensors 73, confirmation of the lodgement envelope having been completed is obtained. This, thus, avoids the danger of a person fraudulently claiming that a lodgement has been made. By virtue of the fact that the transfer housing is pivotal from the receiving position to the discharge position under the action of the counterweights there is no danger of serious injury being caused to the fingers or hand of a user should the user's fingers or hands be inadvertently caught between the secondary inlet and the main inlet during pivoting of the transfer housing from the receiving to the discharge position.

While the transfer housing has been described as being of a particular shape and construction, the transfer housing may be of any other suitable or desired shape and construction. While the main housing has been described as being of cylindrical shape, the main housing may be of other suitable shape. Needless to say, while it is preferable, it is not essential that the transfer housing be pivotally movable in the main hollow interior region of the main housing, the transfer housing may be otherwise movable. Needless to say, while the chute has been described as being an

- elongated chute extending between an inlet and outlet, while this is preferable, it is not essential. Indeed, in certain cases, it is envisaged that a single communicating opening to the secondary hollow interior 5 region may be provided which would act as an inlet and outlet. In which case, the transfer housing would be pivoted or moved through a sufficient distance for aligning the communicating opening with both the main inlet and the main outlet of the main housing.
- 10 While particular types of first and second detecting means have been described, other suitable detecting means may be provided. It will of course be appreciated that it is not essential to progressively monitor the passage of the lodgement envelope from the 15 chute, all that is required is confirmation that the lodgement envelope has passed from the chute.

CLAIMS

1. Transfer apparatus for transferring an article to a container, the transfer apparatus comprising a main housing defining a main hollow interior region and having a main inlet to and a main outlet from the main hollow interior region, a transfer housing mounted within the main hollow interior region of the main housing, the transfer housing having a secondary hollow interior region for receiving the article, and a communicating means for selectively and alternately communicating the secondary hollow interior region with the main inlet and the main outlet of the main housing, the transfer housing being movable within the main hollow interior region from a receiving position with the communicating means communicating the secondary hollow interior region with the main inlet for receiving the article in the secondary hollow interior region, to a discharge position with the communicating means communicating the secondary hollow interior region with the main outlet for discharging the article to the container, a closure means on the transfer housing for closing the main inlet of the main housing when the communicating means is communicating the secondary hollow interior region with the main outlet, and a means for moving the transfer housing between the receiving position and the discharge position.

2. Transfer apparatus as claimed in Claim 1 in which the closure means closes the main inlet before the communicating means communicates the secondary hollow interior region with the main outlet.
- 5 3. Transfer apparatus as claimed in Claim 1 or 2 in which a detecting means is provided for detecting when the article has passed from the secondary hollow interior region through the main outlet, and a retaining means is provided for retaining the transfer housing in the discharge position, the retaining means being responsive to the detecting means for retaining the transfer housing in the discharge position on the detecting means failing to detect the passage of the article through the main outlet, and the retaining 10 means being responsive to the detecting means for releasing the transfer housing for enabling the transfer housing to move from the discharge position to the receiving position on the detecting means detecting the passage of the article through the main outlet.
- 15 4. Transfer apparatus as claimed in Claim 3 in which the retaining means comprises a latch means co-operable with the transfer housing, the latch means being movable from an engaged position retaining the transfer housing in the discharge position to a disengaged 20 position enabling the transfer housing to move from the

discharge position to the receiving position.

5. Transfer apparatus as claimed in any preceding
claim in which the means for moving the transfer
housing between the receiving position and the
5 discharge position comprises a drive motor for moving
the transfer housing from the discharge position to the
receiving position.

6. Transfer apparatus as claimed in Claim 5 in which
the retaining means is co-operable with the drive motor
10 for releasing the retaining means prior to the drive
motor moving the transfer housing from the discharge to
the receiving means.

7. Transfer apparatus as claimed in Claim 5 or 6 in
which a disabling means is provided for disabling the
15 drive motor for preventing the drive motor moving the
transfer housing from the discharge position to the
receiving position, the disabling means being
responsive to the detecting means for disabling the
drive motor on the detecting means failing to detect
20 passage of the article through the main outlet.

8. Transfer apparatus as claimed in any preceding
claim in which the means for moving the transfer
housing between the receiving position and the

discharge position comprises an urging means for urging the transfer housing from the receiving position to the discharge position.

9. Transfer apparatus as claimed in Claim 8 in which
5 the urging means comprises a counterweight mounted on the transfer housing for urging the transfer housing from the receiving position into the discharge position.

10. Transfer apparatus as claimed in any preceding
10 claim in which the communicating means comprises a secondary inlet and a secondary outlet located in the transfer housing communicating with the secondary hollow interior region, for communicating respectively with the main inlet and the main outlet.

15 11. Transfer apparatus as claimed in Claim 10 in which the secondary hollow interior region defines an elongated chute extending through the transfer housing from the secondary inlet to the secondary outlet.

12. Transfer apparatus as claimed in any preceding
20 claim in which the transfer housing is pivotally mounted in the main housing.

13. Transfer apparatus as claimed in Claim 12 in which

- the main housing is of cylindrical construction comprising a cylindrical wall extending between respective opposite spaced apart end caps, the cylindrical wall with the end caps defining the main hollow interior region, and the cylindrical wall defining an axis of generation which forms the central axis of the main hollow interior region, the pivot axis of the transfer housing co-inciding with the central axis of the main housing.
- 10 14. Transfer apparatus as claimed in Claim 13 in which the main inlet and the main outlet are provided through the cylindrical wall at circumferentially spaced apart locations.
- 15 15. Transfer apparatus as claimed in Claim 13 or 14 in which the transfer housing extends diametrically across the main hollow interior region through the central axis.
- 20 16. Transfer apparatus as claimed in Claim 15 in which the transfer housing extends diametrically across the main hollow interior region a distance just less than the internal diameter of the main hollow interior region to facilitate pivoting of the transfer housing between the receiving and discharge positions.

17. Transfer apparatus as claimed in any of Claims 13 to 16 in which the centre line of the main outlet and the centre line of the main inlet extend from the central axis of the main hollow interior region and are disposed at an angle of at least 70° relative to each other.
18. Transfer apparatus as claimed in Claim 17 in which the centre lines of the main outlet and the main inlet are disposed to each other at an angle of at least 90°.
- 10 19. Transfer apparatus as claimed in Claim 18 in which the centre lines of the main outlet and the main inlet are disposed to each other at an angle in the range of 110° to 120°.
- 15 20. Transfer apparatus as claimed in any of Claims 13 to 16 in which the transfer housing is pivotal through an angle from the receiving position to the discharge position of at least 60°.
- 20 21. Transfer apparatus as claimed in Claim 20 in which the transfer housing is pivotal through an angle from the receiving position to the discharge position of at least 70°.
22. Transfer apparatus as claimed in Claim 21 in which

the transfer housing is pivotal through an angle from the receiving position to the discharge position of at least 90°.

23. Transfer apparatus as claimed in Claim 22 in which
5 the transfer housing is pivotal through an angle from the receiving position to the discharge position in the range of 60° to 70°.

24. Transfer apparatus as claimed in any of Claims 13 to 23 in which a stop means is provided in the main
10 housing for limiting the angle of movement of the transfer housing between the receiving and discharge positions for aligning the respective main and secondary inlets and the respective main and secondary outlets when the transfer housing is in the receiving
15 and discharge positions, respectively.

25. Transfer apparatus as claimed in any preceding claim in which a limit sensing means is provided for monitoring the position of the transfer housing.

26. Transfer apparatus as claimed in any of Claims 3
20 to 25 in which the detecting means comprises a first detecting means for detecting the presence of the article in the secondary hollow interior region, and a second detecting means for detecting discharge of the

article through the main outlet.

27. Transfer apparatus as claimed in Claim 26 in which the second detecting means comprises at least two sensing means, the sensing means being located towards 5 the secondary outlet at longitudinally spaced apart intervals along the chute for detecting the progressive movement of the article along the chute through the outlet.
28. Transfer apparatus as claimed in Claim 27 in which 10 each sensing means comprises a photoelectric sensor.
29. Transfer apparatus as claimed in any preceding claim in which the transfer apparatus is for transferring an envelope or pouch from an input opening formed in a panel to a container remotely located from 15 the input opening.
30. Transfer apparatus substantially as described herein with reference to and as illustrated in the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17
The Search report)

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Search Examiner
S J CHURCH

Date of completion of Search
27 JUNE 1994

Databases (see below)

- (i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Documents considered relevant following a search in respect of Claims :-
1-30

Categories of documents

- X: Document indicating lack of novelty or of inventive step. P: Document published on or after the declared priority date but before the filing date of the present application.
- Y: Document indicating lack of inventive step if combined with one or more other documents of the same category. E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.
- A: Document indicating technological background and/or state of the art. &: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2194284 A	(BROWN LTD) see page 4 lines 103-128 in particular	1,2,8, and 9
X	GB 0325361 A	(HOBBS) see page 4 lines 5-29 in particular	1,2,8 and 9
X	GB 0308855 A	(CHATWOOD) see Figure 3 for example	1,2 and 10
X	EP 0438946 A1	(FICHET-BAUCHE) see Figure 2 for example	1
X	WO-87/05068 A1	(ELLEBO) see Figure 4-7 in particular	1 and 2
X	US 3942 435 A1	(AULTZ et al) see especially Figures 2-4 and column 9 lines 41-58	1,2,5 and 7
X	US 3897901 A	(GROSSWILLER) see Figures 15-18 and column 8 line 26 - column 9 line 49	1,2,5, 10,11,12, 25 and 29
X	US 3784090 A	(MARKHAM) see especially Figures 4-7	1 and 2

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